Space Weather Forecast

Issued on Sunday, 01 January 2023 at 01:19 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

Space Weather Forecast Headline: Chance of Moderate X-ray flares throughout. Possible glancing blow from a CME late in the period.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Low over the past 24 hours, with frequent Common class flares, the most notable at 31/2148 UTC from AR3180. There are currently five numbered active regions on the visible disc, with AR3176 and AR3180 currently moderately magnetically complex. AR3176 remains the largest region on the disc, but AR3179 is not far behind in size. All regions, apart for the small and simple AR3173, have contributed to the Common class flares through the period.
At least one CME appears to have been generated by the various Common class flares. Once coronagraph imagery becomes available analysis will be undertaken to determine if any are likely to be Earth directed.

Solar Wind / Geomagnetic Activity: Solar winds were indicative of coronal hole connection, rising rather erratically from around 520-550km/s to become occasionally strong later in the day, peaking at 670km/s at 31/1938 UTC. The strength of the solar wind's magnetic field was predominantly Weak, but briefly peaked at Moderate levels early in the day. The important north-south component was often negative and the corresponding geomagnetic activity was Quiet to Active.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) was at background with no solar radiation storms occurring.

Four-Day Space Weather Forecast Summary

Solar Activity: Low to Moderate activity is expected, with an ongoing daily chance of Moderate X-ray flares. There is a slight chance of Strong class flares occurring.

Solar Wind / Geomagnetic Activity: A coronal mass ejection (CME) which was observed in coronagraph imagery, associated with the Moderate class flare at 30/1528 UTC from AR3176, has been analysed and shows a possible glancing blow at Earth either late on the 3rd Jan (Day 3) or early on the 4th Jan (Day 4). No other Earth directed CMEs are currently expected. The ongoing coronal hole influence is expected to continue today (New Year's Day) then gradually decline through days 2 and 3 (2nd and 3rd Jan). A further coronal hole enhancement is expected later day 4 (4th Jan). The resulting geomagnetic activity is expected to be predominantly Quiet to Unsettled, but with isolated Active intervals likely, especially at first today, then from late day 3 onwards.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is forecast to remain at background with no solar radiation storms occurring. However, there is a slight chance of these rising in response to any larger flares that may occur, and perhaps exceeding the S1/Minor Radiation storm level.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	20	5	20	30
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	40	40	40	40
Very Active	R3 to R5 X	No	5	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	5	10	10	10
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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